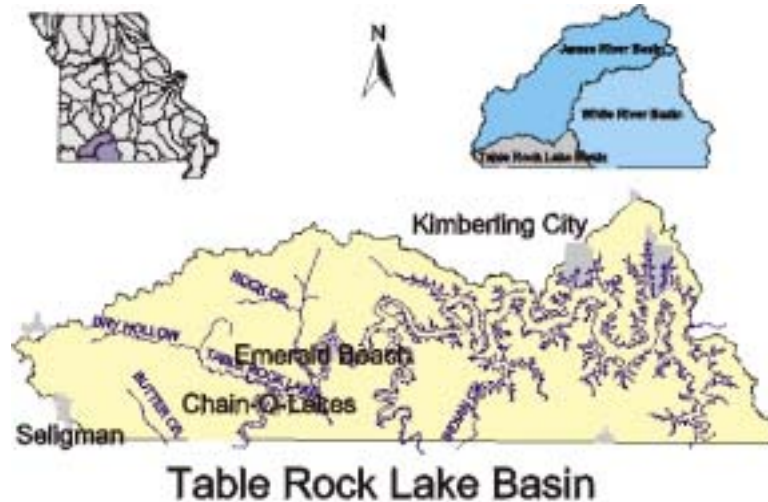




Department of Natural Resources
Division of Water Protection and Soil Conservation
Water Pollution Control Program
Basin Plan Facts

Table Rock Lake Basin – 11010001



BASIN DESCRIPTION

The Table Rock Lake basin is part of the White River basin, which covers 5,184 square miles of Missouri and Arkansas. In 1958 the damming of the White River in Taney County, Missouri resulted in the creation of Table Rock Lake. The lake is one of the largest in Missouri covering from 43,000 to 52,000 acres, and provides drinking water, boating, swimming, fishing and other recreational opportunities. The area is a popular tourist destination with visitor use of the Table Rock Lake area estimated to be between 30 and 40 million hours per year. The area is also growing rapidly as a location for permanent residences and year round businesses. In 1980, the population of Stone and Barry counties totaled approximately 40,000. The latest data available is from 1997 when the population was estimated at nearly 60,000 for these two counties (U.S. Census Bureau 1998).

<http://www.conservation.state.mo.us/fish/watershed/whriver/landuse/390lut08.htm>

The Table Rock watershed is composed of Burlington limestone in the uplands and Jefferson City-Cotter dolomite in the valleys. There are only three notable springs in the watershed as compared to more than 30 springs in the James River basin immediately north of the Table Rock Lake basin. This reduction in the number of springs is due to the southward thinning of the Burlington limestone, the geologic formation within which most spring systems in the region are formed. The Northview Shale, an aquitard which prevents the downward movement of contaminated surface water into the groundwater, is absent in much of the basin. Thus, there is significant potential for contamination of drinking water aquifers.

<http://www.conservation.state.mo.us/fish/watershed/whriver/geology/390getxt.htm#gef2>

WATER QUALITY CONCERNS

The waters in this basin are affected by both point source and nonpoint source pollution. Point source pollution is a discharge of contaminants from a single location, such as a wastewater treatment plant. Individual wastewater treatment plants can serve industries, small businesses, subdivisions, mobile home parks, apartment complexes, or entire cities. Increasing human population increases the volume of point source wastewater discharged to streams and lakes. Point source discharges to the streams and lakes in this basin have become significant due to the large population growth in the south Springfield, Table Rock Lake and West Branson area. There are presently 137 permitted wastewater treatment facilities that discharge wastewater in the James River and Table Rock Lake basins. Of these, 135 contribute significant nutrients and an average total discharge of 55.4 million gallons per day (MGD) of wastewater. The largest single wastewater source is the Springfield Southwest Wastewater Treatment Plant, which discharges 42.5 MGD or 77% of the total wastewater load to Table Rock Lake originating in Missouri.

The major contaminants associated with point source discharges are; 1) nitrogen and phosphorus, which can stimulate excess algae growth in streams and lakes, 2) bacteria, which can be a threat to swimmers and 3) biological oxygen demanding substances (BOD). BOD is a measure of organic materials in the water that may remove dissolved oxygen from the stream or lake and stress aquatic life.

Nonpoint source pollution is waste that is not released from a specific, identifiable point, but from numerous points that are spread out and difficult to identify and control. Significant nonpoint sources would include stormwater runoff from cattle pastures, poultry farms and dairies and stormwater runoff from urban areas. Major pollutants from these sources include nitrogen, phosphorus, sediment, and bacteria. Urban runoff can also carry heavy metals or toxic organics. Other potential nonpoint sources include sedimentation from erosion in disturbed watersheds, sludge application from sewage treatment facilities, stormwater runoff from mining sites, and seepage from septic tanks. Continuing urban and suburban development in the watershed will increase sewage loads and stormwater runoff problems in these lakes and area streams.

Animal Feeding Operations (AFOs) have increased significantly in the basin and are a major nonpoint source concern. AFOs are often a blend of industry and agriculture where thousands or tens of thousands of animals (depending on type) are confined, usually in buildings. The waste from these operations is typically stored for a time, then applied to the land as fertilizer. The amount of waste presently generated by AFOs and land applied in the James River and Table Rock basin is equivalent to the wastes generated by 613,700 people.

[Table 1](#) shows the current human population equivalent of permitted AFOs in the James River and Table Rock Lake basins (MDNR, 2000).

Livestock Type	Number of Animals	Population Equivalent
Dairy Cattle	960	25,000
Turkeys	366,000	17,300
Broiler Chickens	5,623,000	562,300
Laying Hens	101,000	9,100
TOTAL:		613,700

The most important water quality concern in the basin is the eutrophication of Table Rock Lake. Eutrophication is nutrient enrichment of a stream or lake, usually by nitrogen and or phosphorus that promotes excessive algae growth. Studies by the University of Missouri indicate that phosphorus appears to be the cause of eutrophication in Table Rock Lake.

The relative importance of point and nonpoint sources of phosphorus was estimated by DNR in 1998 based upon existing instream water quality data. These estimates are based on the best available water quality and flow data from monitoring stations in the James, White, and Kings Rivers. From these sources it is estimated that Table Rock Lake receives about 2,200 pounds per day of total Phosphorus, with point sources accounting for one third and nonpoint sources two thirds of the total.

[Table 2:](#) Estimated Daily Phosphorus Loading into Table Rock Lake by Source Category.

Sources of Phosphorus Loading	Phosphorus (Lbs./Day)
Point Sources	
Upper James River including Springfield SW WWTP	622
Kings River including Berryville, AR	12
Other Point Sources >5 mi. from Table Rock Lake	31
Other Point Sources <5 mi. from Table Rock Lake	10
Nonpoint Sources	
Upper James River (upstream of Boaz)	345
Kings River upstream of Berryville	274
All other watersheds	910
Total Point Source Load	675
Total Nonpoint Source Load	1529

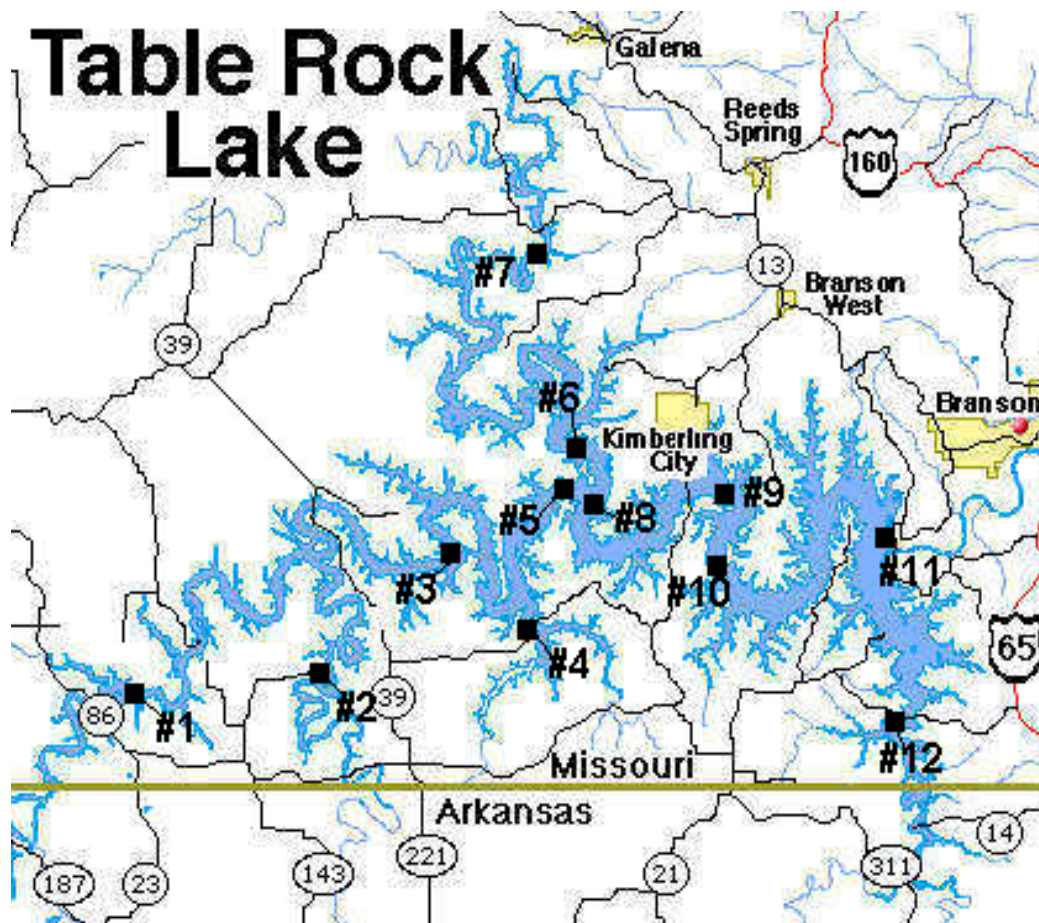
Staff of the University of Missouri and volunteers have been monitoring the water quality of Table Rock Lake for over ten years. The impact of the nutrient rich James River is apparent in the James River arm of Table Rock Lake (station 7 on map) where nitrogen, phosphorus and algal chlorophyll levels are higher than any other lake location monitored. The high levels of algae in the James River arm, as indicated by the chlorophyll levels, are responsible for the low Secchi (water visibility) readings at that station.

[Table 3:](#) shows average water quality data for 12 locations on Table Rock Lake from 1998:

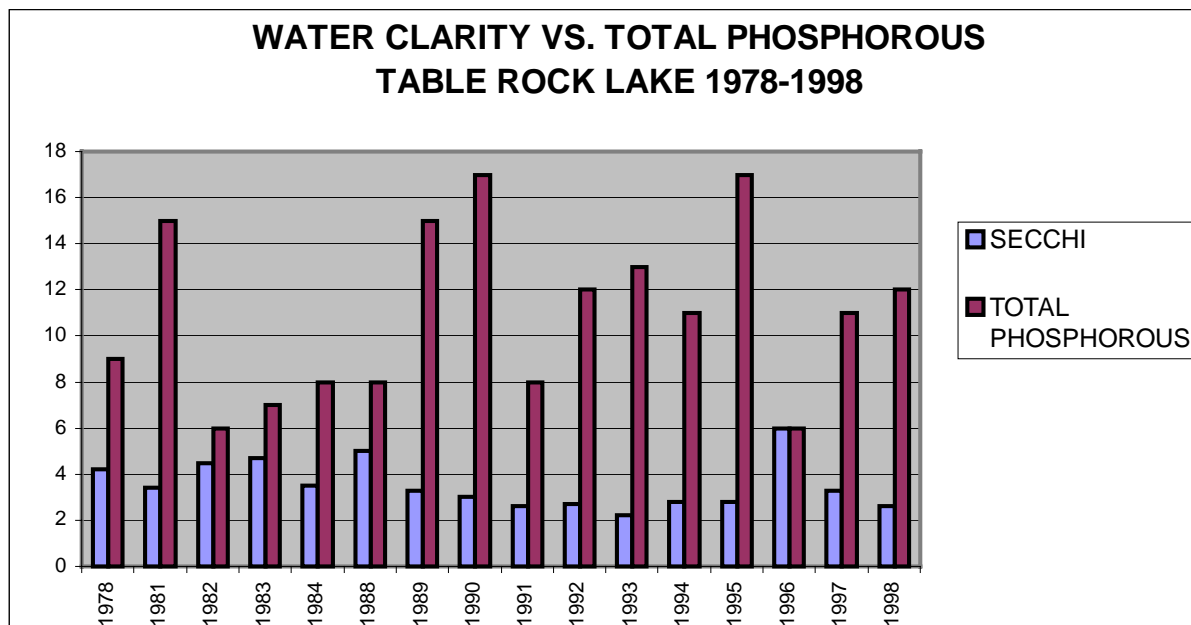
Location	Nitrogen Ug/L	Phosphorus ug/L	Chlorophyll ug/L	Secchi (inches)
#1	397	15	3.4	120
#2	423	40	16.2	50
#3	317	11	4.2	157
#4	464	17	5.0	101
#5	377	12	5.0	151
#6	475	19	7.3	115
#7	724	57	18.5	46
#8	554	20	6.8	109
#9	519	16	6.4	115
#10	444	12	6.2	138
#11	434	14	5.8	136
#12	498	18	9.0	100

(J. Jones, and Lakes of Missouri Volunteer Program 1999)

Secchi measurements are the depth of water that a black and white disc remains visible to the human eye. Larger numbers indicate clearer water.



Two decades of total phosphorus and Secchi depth in Table Rock Lake near the dam are graphed below. While there is considerable variation from year to year, the long term trend seems to indicate declining Secchi depths (declining visibility) and increasing amounts of phosphorus.



Secchi depth in meters. Total Phosphorus is measured in ug/L.

WATER QUALITY MANAGEMENT

The amount of phosphorus being delivered to Table Rock Lake via the James River basin is of major concern. Excess phosphorus is a cause of eutrophication, the nutrient enrichment of an aquatic ecosystem that promotes the growth of algae. Concerns about eutrophication in Table Rock Lake and the James River have resulted in specific effluent limitations on point source discharges of phosphorus in the James River basin. This new regulation, effective November 1999, states that discharges to the Table Rock Lake watershed shall not exceed 0.5 mg/l of phosphorus as a monthly average. All new discharges must be designed to comply with these guidelines. Existing discharges with a design flow of 1.0 million gallons per day or greater must comply within four years. Existing discharges with a design flow of 0.1 million gallons per day to 1.0 million gallons per day must comply with an effluent limit of 1.0 mg/l of phosphorus as a monthly average within 4 years. In addition, these facilities must comply with the 0.5 mg/l phosphorus limit as a monthly average within eight years. Existing discharges with a design flow of 22,500 gallons per day to 0.1 million gallons per day must comply with an effluent limit of 0.5 mg/l phosphorus limit as a monthly average within eight years. The city of Springfield, anticipating these new regulations has already begun a phosphorus reduction program.

Related Sites

Missouri Department of Conservation – Missouri's Rivers and Their Watersheds

<http://www.conservations.state.mo.us/fish/watershed/>

United States Geologic Survey – Water Use in the United States

<http://water.usgs.gov/watuse/>

United States Geologic Survey – Ozark NAWQA Study

http://water.usgs.gov/nawqa_home.html

City of Springfield Public Works – Engineering Maps

<http://springfield.missouri.org/gov/publicworks/engineering/>

CARES Watershed Information Clearinghouse – Water Resource Atlas

<http://www.cares.missouri.edu/cwic/mowater/mowater10.html>